CPS 9578/1
Two Rocks Beach Access Way

Revegetation and Rehabilitation Plan

May 2022

City of Wanneroo

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1. Introduction

The City of Wanneroo (CoW) is proposing to construct a beach access, access road and carpark within the boundaries of Lot 8613 on Deposited Plan 213232; Lot 8989 on Deposited Plan 213232; and Lot 15452 on Deposited Plan 40341, in Two Rocks. The project, the Two Rocks Beach Access (hereafter known as the TRBA), will be located in an area of 1.43 hectares of coastal vegetation that is situated in foreshore reserve, south of the Two Rocks Marina and bound by the Indian Ocean to the west and Two Rocks Road to the east (Figure 1 – delineated in red).

The CoW submitted a Native Vegetation Clearing Permit (NVCP) application to clear 1.43 hectares of coastal vegetation to the Department of Water and Environmental Regulation (DWER) for assessment (CPS 9578/1) on 31 January 2022. The NVCP application explicated that the proposed clearing area comprises of priority flora *Leucopogon maritimus* (Priority 1), *Beyeria cinerea subsp. cinerea* (Priority 3) and *Stylidium maritimum* (Priority 3), two priority ecological communities, Bush Forever area 397 and conservation significant fauna Quenda (*Isoodon fusciventer*) (Priority 4) and Black-striped Snake (*Neelaps calonotos*) (Priority 3).

DWER carried out a preliminary assessment of the application and on 28 March 2022 identified that:

- Due to the presence of the above mentioned sensitive receptors, evidence of additional efforts to avoid and/or mitigate the need for clearing are required to be provided; and
- That the area proposed to be cleared is entirely within Bush Forever area (BFA) 397 and that an offset package would need to be provided within Bush Forever 397, in accordance with the WA Environmental Offsets Policy (DWER, 2011) and Appendix 4 of State Planning Policy 2.8 (WAPC, 2010).

This Two Rocks Beach Access Rehabilitation and Revegetation Plan (the “RRP”) has therefore been developed to describe how each of the above will be achieved, as well as the rehabilitation and revegetation of an area of offset, as described below.

Figure 1: Location Plan of proposed works (land parcels outlined in red).

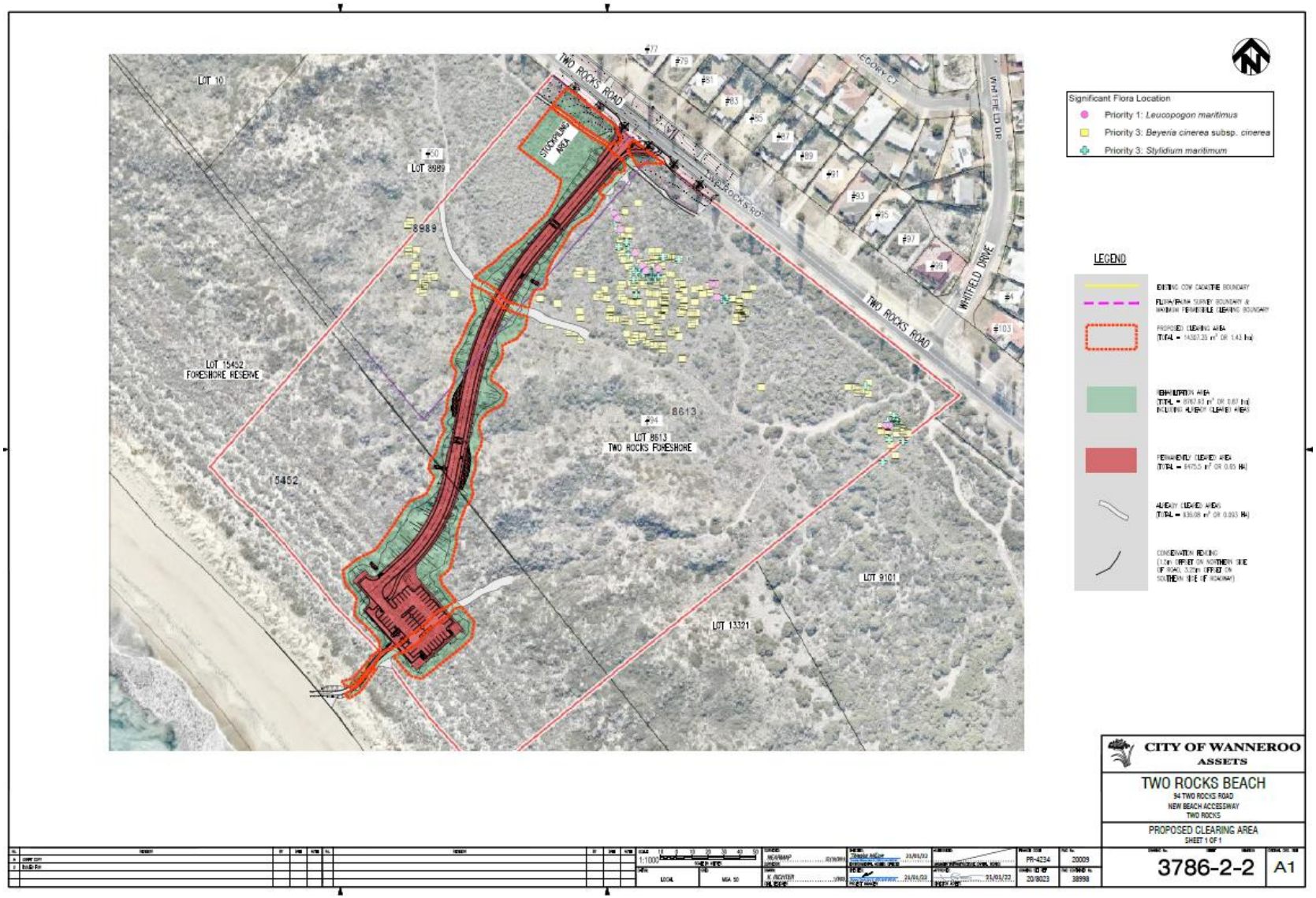

Figure 2: Clearing and Onsite Rehabilitation Plan

As advised by DWER officers on 28 March 2022; and in accordance with State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan Region (SPP 2.8) (WAPC, 2010); a 2:1 offset ratio is required to counterbalance the permanent removal of 0.65 hectares of native vegetation within Bush Forever site 397. As such, the CoW is proposing the following offsets:

- Revegetation of 0.87 hectares of areas disturbed during construction (0.78 hectares) and previously cleared (0.09 hectares) of the TRBA
- Transferring the vesting of Lots 10 and 8989 Two Rocks Road, Two Rocks, to the Crown under City of Wanneroo management and changing the reserve from Freehold to "Conservation and Passive Recreation" vesting to provide an environmental land offset for the permanently cleared areas.

In addition to the aforementioned, the purpose of the Two Rocks Beach Access Rehabilitation and Revegetation Plan (hereafter known as the RRP) is to guide the on ground works relating to the revegetation of 0.87 ha of areas disturbed during development of the TRBA. This revegetation and rehabilitation plan has been developed in accordance with 'A Guide to Preparing Revegetation Plans for Clearing Permits under Part V of the *Environmental Protection Act 1986*' (DWER, 2018).

This plan has been developed on behalf of the City of Wanneroo by Danielle Garrett, who is employed as the Environmental Asset Planner at the City of Wanneroo. This RRP was based on the Rehabilitation and Revegetation Plan previously submitted by the City as part of CPS 8807/1. Correspondence relating to the RRP should be addressed to:

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The CoW undertake revegetation projects on an annual basis as part of their Capital Works programs and as a requirement of clearing permit conditions and Federal approvals and have internal resources providing expertise on completion criteria and onsite revegetation techniques. Most recent examples of rehabilitation and revegetation projects undertaken by the CoW include:

- The Mindarie-Burns Beach Dual Use Path – revegetation and rehabilitation activities to meet completion criteria under CPS 8820/3
- Maintenance and revegetation activities at Mather Reserve and Mary Street Reserve to satisfy conditions of EPBC 2007/3479
- Ongoing restoration of coastal and bushland sites under the City's Capital Works program, including weed control, fencing, rehabilitation, erosion control and revegetation.

2. Existing Environment

2.1 Land Tenure and Zoning

The proposed TRBA is located within three separate land parcels, all are zoned for Parks and Recreation under the Metropolitan Region Scheme. A summary of land tenure and zoning is provided in Table 1, below.

Table 1: Land tenure and zoning

Lot Number	Land Owner	MRS Zoning	Reserve Purpose
Lot 8613 on Deposited Plan 213232	Crown Land – COW Managed	Parks and Recreation	Public Recreation
Lot 8989 on Deposited Plan 213232	Western Australian Planning Commission	Parks and Recreation, Urban	N/A - Freehold
Lot 15452 on Deposited Plan 40341	Crown Land – COW Managed	Parks and Recreation, Waterways	Recreation and Purposes Incidental Thereto

The proposed land offset is located within two separate land parcels, which are zoned for Parks and Recreation under the Metropolitan Region Scheme. A summary of land tenure and zoning is provided in Table 2, below.

Table 2: Land tenure and zoning

Lot Number	Land Owner	MRS Zoning	Reserve Purpose
Lot 10 on Deposited Plan 28738	Western Australian Planning Commission	Parks and Recreation	N/A - Freehold
Lot 8989 on Deposited Plan 213232	Western Australian Planning Commission	Parks and Recreation	N/A - Freehold

2.2 Vegetation and Flora

The proposed clearing for the TRBA will initially facilitate the completion of an Unexploded Ordnance (UXO) remediation search; followed by a geotechnical survey to enable final design completion; and finally to facilitate the construction of a beach access and car park. The TRBA construction extent (1.43 hectares) lies within the biological survey area (12.68 hectares) and runs west-east across the Survey Area, as defined in Figure 2.

The City engaged One Tree Botanical to undertake a Level 2 Flora and Vegetation Survey (Appendix A), consistent with the Technical Guide Flora and Vegetation Surveys for Environmental Impact Assessment; Targeted and Detailed Surveys (EPA, 2016). The assessment occurred over two sampling periods, 13-16 September and 19-21 October 2019.

On 29 October 2020, Environmental Officers Danielle Garrett, Tenaha Wilson and Andrew Hawthorne inspected the potential offset site to adequately plan the rehabilitation of the site. During this inspection, it was identified that weed species *Thinopyrum distichium* was the sole species of the frontal dune of this area. Both species at the time were flowering and were distinguishable. This then prompted the City Officers to inspect the frontal dune of the previously surveyed TBRA site. It was then confirmed that the previously identified *Spinifex longifolius* within the frontal dune (Vegetation Type A1) was in fact weed species *Thinopyrum distichium*.

To further verify this, a further site inspection with the TRBA survey botanist (Kelli McCreery) was conducted on the 5th November and it was agreed that the relevant maps and information within the previously provided survey would be updated to reflect the species identification change.

No Threatened Ecological Communities (TECs) listed under the Western Australian *Biodiversity Conservation Act 2016* or the Federal *Environmental Protection Biodiversity Conservation Act 1999* were recorded in the study area.

McCreery (One Tree Botanical, 2020) found that there were challenges to assessing vegetation in this area due to the lack of a proper regional dataset of quadrat data in the Gibson et al. (1994) dataset from near-coastal and Quindalup Dune areas.

Despite this, the assessment was completed against the available information. From the assessment, it was noted that two Priority Ecological Communities (PECs), or variants of, occurred in the study area:

- **PEC SWAN 26**: “Northern Spearwood shrublands and woodlands” (FCT24) (Vegetation Type C) and woodlands
- **PEC SWAN 21**: “Coastal shrublands on shallow sands, southern Swan Coastal Plain” (FCT29a) (Vegetation Types B1 and D1).

“Coastal shrublands on shallow sands, southern Swan Coastal Plain (FCT29a)” is the largest represented PEC, with approximately 0.87 hectares occurring within the TRBA alignment, of which approximately 0.33 hectares occurs within the construction extent. Northern Spearwood shrublands and woodlands (FCT24) also occurs within the TRBA alignment (approximately 0.12 hectares), of which approximately 0.03 hectares occurs within the construction extent.

Six vegetation communities and cleared areas were mapped within the Survey Area (One Tree Botanical, 2020) which forms part of a coastal mosaic, typical of dune systems. The vegetation types included one grassland and five shrublands.

Seven vegetation types were recorded within the study area:

- Low-Lying Primary Dunes on Unconsolidated Sand A1: Incipient Foredune (younger): Uniform regrowth of Grassland **Thinopyrum distichum* (0.137 ha)
- Low-Lying Primary Dunes on Unconsolidated Sand A2: Established Foredune (older): Sparse Shrubland *Olearia axillaris* over Grassland *Spinifex longifolius* and **Thinopyrum distichum* (0.243 ha)
- Low-Lying Primary Dunes on Unconsolidated Sand A3: Beach-ridge Plain: Open Shrubland *Olearia axillaris*, *Rhagodia baccata* subsp. baccata and **Pelargonium capitatum* over Sparse Grassland *Spinifex longifolius* and Sparse Vineland *Cassytha flava var. flava* (0.67 ha)
- Tall Secondary Dunes On Unconsolidated Sand B1: Shrubland dominated by *Acacia cyclops*, *Scaevola crassifolia*, *Spyridium globulosum*, *Santalum acuminatum*, *Myoporum insulare*, *Olearia axillaris*, *Rhagodia baccata subsp. baccata* and *Acanthocarpus preissii*, Sparse Vineland *Hardenbergia comptoniana* and *Cassytha flava var. flava*. Over Forbland dominated by *Senecio pinnatifolius var. latilobus* (1.18 ha)
- Low Dunes On Semi-Consolidated Sand C1: Species rich low Shrubland dominated by *Melaleuca systena* and species rich Forbland dominated by *Lomandra maritima* and Sparse Sedgeland *Lepidosperma calcicola* and Sparse Rushland *Desmocladus asper* (0.291 ha)
- Low Rises With Limestone Outcropping D1: Closed Shrubland *Melaleuca cardiophylla* with other typical shrubs *Melaleuca huegelii*, *Acacia xanthina* and *Dodonaea aptera* with Sparse Vineland *Cassytha aurea var. aurea* over Forbland of native and introduced herbs (0.97 ha)
- Cleared Areas E1: Historically cleared areas; informal walking paths, informal vehicular sand tracks (unused and partially overgrown) (0.182 ha).

Of these, B1 is the most commonly represented vegetation community within the TRBA alignment.

Vegetation type A1 consists entirely of weed species, dominated by **Thinopyrum distichum* (Sea Wheatgrass) on the primary fore dune. From aerial imagery, it appears the species may have either emerged or been planted in the 1990s (Landgate, 2022), when it was commonly used as a rehabilitation species to stabilise dunes (Dixon, 2011). This species will be retained in the TRBA within vegetation type A1 (and where it has proceeded into the A2 vegetation community) to ensure ongoing dune stabilisation, however it will not be replanted as a revegetation species. Infill planting and weed management will occur in a gradual ongoing basis to ensure that the dune stabilisation continues with an eventual overall improved outcome of the diversity in the A2 vegetation area.

Photos and further information for each of the vegetation types in the area proposed to be cleared are provided in Section 5.2.2 of the Flora and Vegetation Survey (Appendix A). Figures 3 and 4 illustrate the vegetation type and vegetation condition of significant flora within the survey area, respectively.

The condition of vegetation mapped within the TRBA alignment ranged from Degraded to Very Good - Excellent, with the majority mapped as Very Good based on the South West Botanical Province (EPA, 2016) and Bush Forever (Keighery, 1994 from Govt. of WA, 2000) vegetation condition scale (Figure 4).

A total of 160 flora species were recorded were recorded from the study area, of which 100 or 63% were natives.

Three Priority Flora species were recorded within the study area:

- *Leucopogon maritimus* (Priority 1);
- *Beyeria cinerea subsp. cinerea* (Priority 3); and
- *Stylidium maritimum* (Priority 3).

Figure 5 illustrates the location of significant flora species within the survey area.

Priority Flora is not common in near coastal areas and three in a single near-coastal vegetation type is unusual. This is an unusually high number for a very small 12.68 hectare near-coastal area. All three species were dominant species within a small area of a single vegetation type (Vegetation Type C - Figure 3) (One Tree Botanical, 2020).

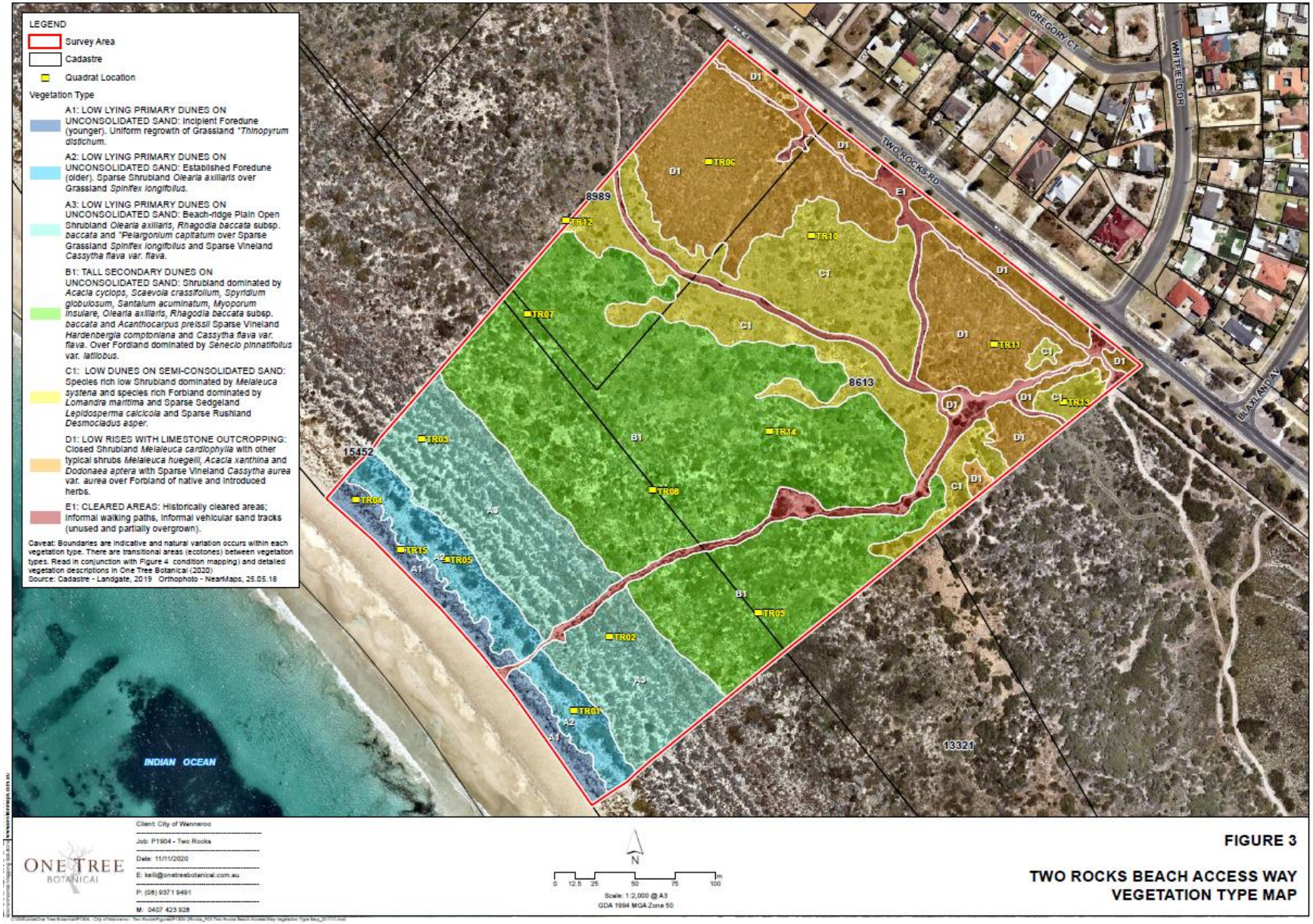


Figure 3: Two Rocks Beach Access Way – Vegetation Type Map (Source: One Tree Botanical (2020))

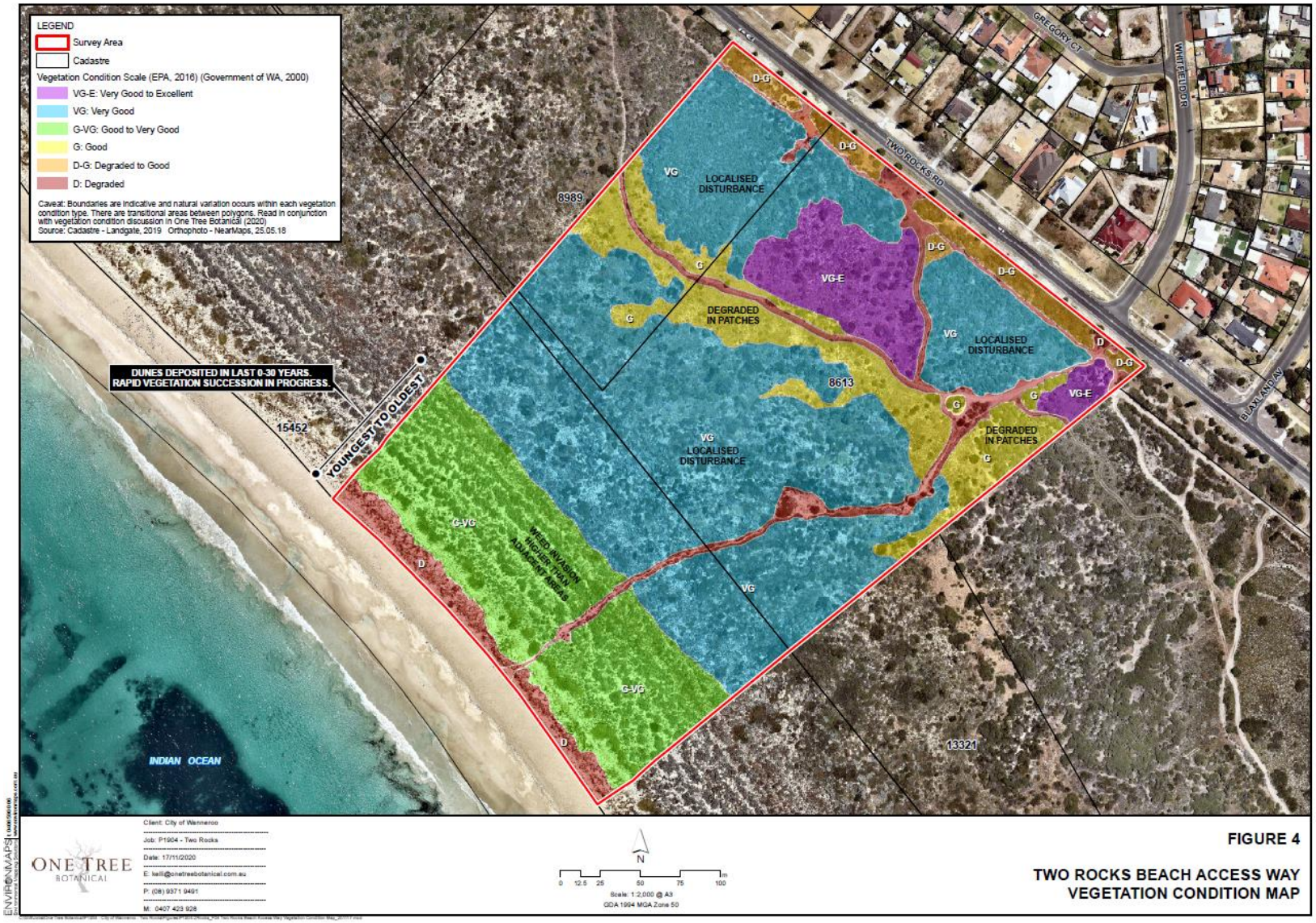


Figure 4: Two Rocks Beach Access Way – Vegetation Condition Map (Source: One Tree Botanical (2020))

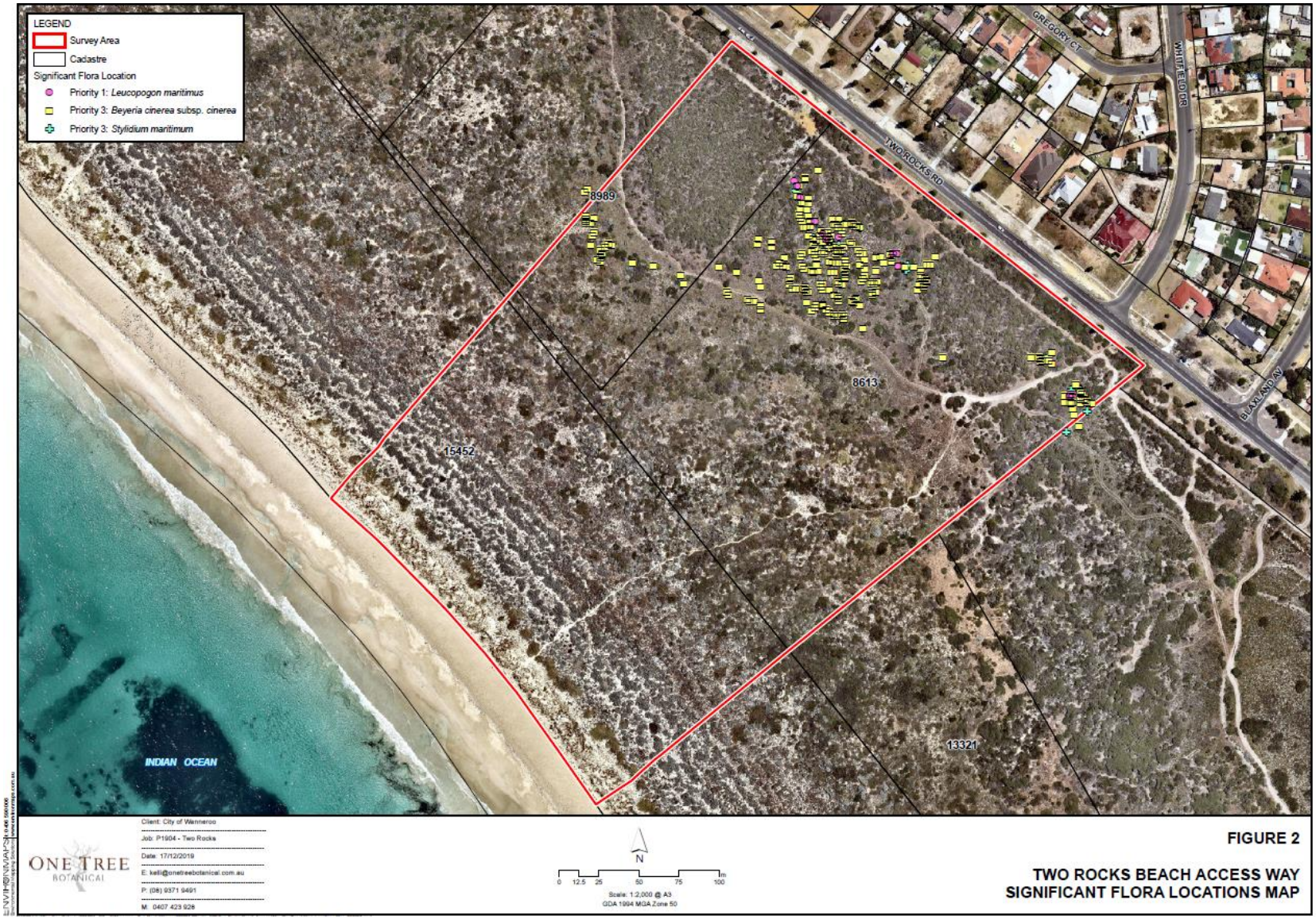


Figure 5: Two Rocks Beach Access Way – Priority Flora Locations (Source: One Tree Botanical (2020))

2.3 Hydrology

A review of the Wetlands of the Swan Coastal Plain feature maps (in the WALGA EPT (2020)) identified that there are no surface water expressions within the immediate area of the TRBA. The closest wetland is Loch McNess, a Conservation Category Wetland located approximately 6 km south east of the sites (WALGA, 2020).

Depth of the ground water ranges from between 19 m below ground level in the east to 3 m in the west (DWER, 2022). The groundwater salinity levels are considered 'marginal' with TDS levels 500 - 1000mg/L (DWER, 2022).

2.4 Fauna

A Basic Fauna Survey of the TRBA (Appendix B) was undertaken by Terrestrial Ecosystems (2020a) on 29 August 2019. Results of the survey found that the survey area comprises of three main habitat types (Terrestrial Ecosystems, 2020a), including:

- Coastal low heath on sand;
- Mixed open shrubland and heath on sand; and
- Mixed closed shrubland over sand and limestone.

Some of the site was described as highly disturbed or cleared, providing no habitat value.

The three main habitat types that occur within the survey area also occur within the TRBA alignment and construction extent. Mixed open shrubland and heath on sand is the most common fauna habitat, with 6.22 ha occurring within the TRBA survey area. The remaining TRBA survey area extent comprises of Mixed closed shrubland over sand and limestone; Coastal low heath on sand and highly disturbed areas with 1.973 ha, 1.915 ha and 0.302 ha, respectively.

A desktop study against the DBCA Schedule/Priority species found that 15 conservation significant fauna species may occur within the area, however Terrestrial Ecosystems (2020) commented that only seven of these may occur within the Study Area, including;

- Quenda (*Isoodon fusciventer*);
- Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*);
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*);
- Fork-tailed Swift (*Apus pacificus*);
- Osprey (*Pandion haliaetus);*
- Peregrine Falcon (*Falco peregrinus); and*
- Black-striped Snake (*Neelaps calonotos)* (Terrestrial Ecosystems, 2020a).

Only the Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) was recorded by Thompson during field observations during the TRBA survey (Terrestrial Ecosystems, 2020a).

During the site inspections conducted by the CoW Officers on 29 October 2020, two species were observed -

- Red-capped Plover (*Charadrius ruficapillus*) – adjacent to the TRBA alignment on the beach; and
- A White-bellied Sea-Eagle (*Haliaeetus leucogaster*), hunting and soaring south of the TRBA alignment.

3. Site History

3.1 Indigenous and European Heritage

A desktop study of the immediate areas of the TRBA alignment indicated no sites of Cultural or Indigenous heritage value.

3.2 Land Use

The suburb of Two Rocks is named after two prominent rocks located offshore from Wreck Point. With the adoption of the State Government's Corridor Plan in 1970, extensive plans were made for the residential development of the Yanchep and Two Rocks area. In 1969, the Bond Corporation Pty Ltd purchased 19,600 acres of pastoral property, previously owned by the Wydgee Pastoral Company, and proceeded to develop Yanchep Sun City as a satellite city and premier tourist resort in Western Australia (State Heritage Office, 2020).

Residential development was well underway in 1972, followed by a marina in 1973/74 and a shopping and recreation centre at Two Rocks. The Two Rocks Marina was developed by Alan Bond as a training base for Australia's challenge of the America's Cup and to provide facilities for recreational boating and for the local fishing industry. Many of the streets in Two Rocks are named after yachts from America's Cup challengers (State Heritage Office, 2020).

In 1981, following an announcement by the WA Government, work began on the construction of Atlantis Marine Park with a $20 million budget over five years. As well as a tourist destination the park was to be used to research marine life. Sun City Pty Ltd was granted a licence by the Department of Fisheries and Wildlife to catch and keep local dolphins. A feature of the park was the 10 metre sculpture of King Neptune designed by local artist Mark Le Buse. The opening of the park was held on 26 December 1981 and by 1982 over one million visitors went through the gates. The park closed in 1990. The King Neptune statue still remains in the locality of Two Rocks near the Two Rocks Shopping Centre (State Heritage Office, 2020).

Prior to the residential development of Two Rocks in 1972, aerial imagery identifies the land in the immediate vicinity of the TRBA alignment to be in a more degraded condition than today (Landgate, 2022). Over the years, the disturbance in this local area has actually decreased (Figure 6). This may be due to previous land uses such as pastoral activities and vehicle access being more intense in this area during the 1970s and 1980s. Recent years have meant that access is now more restricted and access to the general public is now not only unauthorised but also more difficult with deterrents such as fencing and large boulders to discourage unauthorised vehicles.

The survey area of the TRBA was noted to be a relatively intact area of natural vegetation with the following observations (One Tree Botanical, 2020):

- An old vehicle track was present and surrounded by comparatively disturbed vegetation;
- A corridor had been historically cleared for a powerline;
- An informal pedestrian track is present from Two Rocks Road to the beachfront; and
- The beachfront is currently utilised for recreational purposes.

The Survey Area is a part of a much larger Unexploded Ordinance (UXO) Area: Yanchep Two Rocks Artillery Range (ID: 1035) (Department of Defence, 2020). After WWII the broader area

was used by Armed Forces for target practice. As the area is known for its military history, the CoW has committed to conducting UXO searches as part of the TRBA to ensure that the potential risk of UXO is eliminated. A UXO search will be conducted in all areas of the potential construction site for the TRBA.

Figure 6: Historical aerial imagery of the TRBA on 7 June 1977 and 22 February 2022 (Landgate 2022).

4. Potential Impacts

Threats that have the potential to impact on the TRBA project include:

- Loss of priority flora species
- Death or injury of fauna
- Feral animals
- Weeds
- Rubbish
- Unauthorised access
- Fire
- Pathogens and disease.

Details of these threats are discussed below, with suggested mitigation actions, responsibilities and compliance criteria provided with the schedule, in Table 7.

4.1 Loss of Priority Flora Species

As mentioned in Section 2.2.1 and illustrated in Figure 5, three Priority Flora species were recorded within the study area:

- *Leucopogon maritimus* (Priority 1)
- *Beyeria cinerea subsp. cinerea* (Priority 3)

- *Stylidium maritimum* (Priority 3).

This number of priority species in one vegetation type (Vegetation Type C1) and within a small near-coastal area is uncommon and therefore significant (One Tree Botanical, 2020). It is imperative that any impacts to these species are minimised.

To ensure that the impact to these species was minimised, the original alignment of the path was moved to ensure that the minimum number of species would be impacted. This has now been reduced to four individual plants of *Beyeria cinerea* subsp. *cinerea* (Priority 3). The City has had previous success in the salvage of various species at Hardcastle Park, Landsdasle, and Mather Reserve, Neerabup and we anticipate partial success for the salvage of these four individual plants. The City will endeavour to salvage these four individual plants using a professional revegetation nursery and install them into the revegetation area, however, the success of this cannot be guaranteed. .

In addition to this, the remaining Priority species will be identified and clearly demarcated, prior to any work commencing in the area, i.e. UXO search and construction. The preservation and importance of these species will be communicated in awareness sessions to all key personnel involved in the project. The individual species will be checked for intact demarcation and photographed to ensure they are not impacted. This will occur at the following stages of the project:

- Prior to the UXO search
- Prior to construction
- After construction and revegetation of the battered surfaces.

All records of these checks will be maintained and is scheduled into the Project Schedule, as per Table 7.

4.2 Fauna Management

As mentioned in Section 2.4, several conservation species occur within the TRBA survey area (Appendix B) (Terrestrial Ecosystems 2020a), including;

- Quenda (*Isoodon fusciventer*)
- Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*)
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*)
- Fork-tailed Swift (*Apus pacificus*)
- Osprey (*Pandion haliaetus*)
- Peregrine Falcon (*Falco peregrinus*)
- Black-striped Snake (*Neelaps calonotos*).

The City will ensure the potential impacts of fauna are managed through the following measures:

- Awareness sessions - The conservation and importance of fauna species will be communicated to all key personnel involved in the project and as part of the induction process, including speed limits to reduce the risk of fauna fatality;

- The importance of the allowing fauna to safely move on during construction and clearing will be communicated. Where species are unable to safely move on, a qualified wildlife handler will be called to relocate the species; and
- A wildlife carer will be immediately called to remove and rehabilitate any injured fauna and reported to the Project Manager within 24 hours of the event occurring.

4.3 Feral Animals

Although the Matters of National Environmental Significance (MNES) database search identifies previous records of the Chuditch (*Dasyurus geoffroii*), Woylie (*Bettongi penicillata*) and Western Ringtail Possums (*Pseudocheirus occidentalis*) in the study area, these species are no longer present due to destruction of habitat and predation by feral animals, such as foxes and cats (Terrestrial Ecosystems, 2020). Feral animals compete with native animals for food and habitat, and have a dramatic effect on fragile ecosystems (Jones & Parish, 2008).

A high abundance of rabbits and medium abundance of foxes and cats were noted in the fauna survey (Terrestrial Ecosystems, 2020a). Whilst foxes and cats predate small mammals, the rabbit competes with native fauna for food and destroys natural habitat. This can be particularly devastating when trying to establish new vegetation. To mitigate the potential impacts of feral animals, the TRBA project will be included in the City's feral animal control program.

4.4 Weeds

Weed species were identified as part of the TRBA Flora survey (One Tree Botanical, 2020). One Tree Botanical (2020) observed 60 weed species, which mainly occurred adjacent to the existing tracks and disturbed area (Vegetation Type E1). Table 3 summarises these species and their priority for management according to the level of invasiveness and spread as environmental weeds under the Western Australian Environmental Weed Strategy (WAEWS) (Department of Conservation and Land Management, 1999).

Nine weed species were rated high, with 30 species recorded as a Moderate rating.

Table 3: Introduced species and priority for management recorded within the TRBA Study Area (One Tree Botanical, 2020).

Species	Common name	Priority for Management
**Brassica tournefortii*	Mediterranean Turnip	High
**Bromus diandrus*	*Great Brome*	*High*
**Eragrostis curvula*	*African Love Grass*	*High*
**Euphorbia terracina*	*Geraldton Carnation Weed*	*High*
**Hyparrhenia hirta*	*Tambookie Grass*	*High*
**Lagurus ovatus*	*Hare's Tail Grass*	*High*
**Lupinus cosentinii*	*Blue Lupin*	*High*
**Pelargonium capitatum*	*Rose Pelargonium*	*High*
**Romulea rosea*	*Guildford Grass*	*High*
**Aira cupaniana*	*Silvery Hair Grass*	*Moderate*
**Arctotheca calendula*	*Cape Weed*	*Moderate*
**Arctotheca populifolia*	*Dune Arctotheca*	*Moderate*
**Avena barbata*	*Wild Oats*	*Moderate*
**Bellardia trixago*	*Bellardia*	*Moderate*
**Briza maxima*	*Blowfly Grass*	*Moderate*
**Briza minor*	*Shivery Grass*	*Moderate*
**Cakile maritima*	*Sea Rocket*	*Moderate*
**Crassula glomerata*	*stonecrops*	*Moderate*

**Cuscuta planiflora*	*Dodder*	*Moderate*
**Cynodon dactylon*	*Couch Grass*	*Moderate*
**Dischisma arenarium*	*-*	*Moderate*
**Ehrharta brevifolia var. cuspidata*		*Moderate*
**Ehrharta longiflora*	*Annual Veldt Grass*	*Moderate*
**Euphorbia paralias*	*Sea Spurge*	*Moderate*
**Euphorbia peplus*	*Petty Spurge*	*Moderate*
**Galium murale*	*Small Goosegrass*	*Moderate*
**Gladiolus caryophyllaceus*	*Pink Gladiolus*	*Moderate*
**Heliophila pusilla*	*-*	*Moderate*
**Hypochaeris glabra*	*Flatweed*	*Moderate*
**Lysimachia arvensis*	*Pimpernel*	*Moderate*
**Melilotus indicus*	*Indian Sweet-clover*	*Moderate*
**Parentucellia latifolia*	*Common Bartsia*	*Moderate*
**Rostraria cristata*	*Mediterranean Hairgrass*	*Moderate*
**Schinus terebinthifolia*	*Japanese Pepper Tree*	*Moderate*
**Sonchus oleraceus*	*Common Sowthistle*	*Moderate*
**Tetragonia decumbens*	*Sea Spinach*	*Moderate*
**Thinopyrum distichium*	*Sea Wheatgrass*	*Moderate*
**Trifolium campestre var. campestre*	*Hop Clover*	*Moderate*
**Vulpia myuros forma megaleura*	*Rat's Tail Fescue*	*Moderate*

There are no Declared Pest species recorded from the WA Organism List (WAOL) under the *Biosecurity and Agriculture Management Act 2007* or Weeds of National Significance (WONS) in the TRBA study area.

4.5 Rubbish

Dumping of waste is a common occurrence throughout bushland reserves and parks in residential areas in the CoW. The dumping of lawn clippings and garden waste can lead to weed infestation and plant disease. There was no record of rubbish dumping during either the flora or fauna surveys (One Tree Botanical, 2020; Terrestrial Ecosystems, 2020a).

4.6 Unauthorised Access

Aerial imagery indicates that there has been an ongoing issue with 4WD tracks from as early as 1970 (Landgate, 2022). This may have also resulted from the pastoral land use activity that occurred in these areas in the 1970-80s. This would have exacerbated the erosion to the pre-existing blowouts and damage to the vegetation around these tracks, which is evident in historical aerial imagery and appeared to be an increasing footprint in vehicle tracks and degraded areas until approximately 1990. The overall condition of the TRBA appears to have actually improved since this time, evident by aerial imagery (Landgate, 2022) (see Figure 6), where the vehicle tracks and large degraded areas in the area appear to have commenced restoration, either naturally or through rehabilitation efforts.

Development of surrounding areas in recent years has meant that access is now more restricted. Access to the general public is not only unauthorised but also harder to access, with deterrents such as fencing and large boulders to discourage unauthorised vehicles.

The City of Wanneroo and the adjacent developers have historically mitigated unauthorised vehicles in the foreshore areas through various mechanisms such as fencing, CCTV surveillance, blocking of paths with large boulders, signage and public communications relating to the potential impacts and fines that may be imposed for offenders.

4.7 Fire

Fire has the potential to alter the structure, density and composition of natural areas (WALGA, 2004). Fire rarely occurs in the primary coastal dunes due to the higher water content, salt coated debris and bare sanded areas that lack sufficient combustible dry matter and surface litter to act as an ignition source (Dixon, 2011). Fire is therefore not likely to occur in most of the A1 - A3 vegetation types of the TRBA.

Fire history was assessed as part of the flora survey and was observed in each of the quadrats, with the vegetation displaying signs of fire occurring in excess of ten years (One Tree Botanical, 2020). Fire in the adjacent area of the TRBA had occurred approximately five years ago (Figure 7), according to the DFES historical data accessed from the CoW's Intramaps, (CoW Intramaps, 2022).

Figure 7: Historical fire (within the land parcel hatched orange) adjacent to the Two Rocks Beach Access (TRBA).

4.8 Phytophthora

Phytophthora is a plant pathogen that presents a significant threat to the health of ecosystems on the Swan Coastal Plain, affecting more than 40% of the native plant species and half of the endangered species in the south-west of Western Australia. There are several species of *Phytophthora*, but *Phytophthora cinnamomi* is the most widespread and destructive (DBCA, 2020). Dieback is a symptom of a *Phytophthora* sp. infection, killing vegetation because it prohibits the plants' ability to take up the water and nutrients. Dieback can be spread through

various vectors, including; soil, footwear, vehicles, machinery and equipment. It can devastate bushland by removing particular plants and changing the nature of the landscape, possibly driving rare species toward extinction (DBCA, 2020).

A common myth is that *Phytophthora* does not occur in coastal areas due to suppression by calcareous materials, such as limestone, due to its high pH. Whist this is true for *Phytophthora cinnamomi*, it is not the case for other species of *Phytophthora*, such as *Phytophthora multivora* and one or more of the currently undescribed *Phytophthora* species (Scott *et al*., 2009). *Phytophthora multivora* is widely distributed, has a wide host range and is associated with deaths of tuart and other species on calcareous soils (Conservation Commission of WA, 2010). A lot more research is needed for this and other species of *Phytophthora* however it is no longer accepted that the use of limestone, or the presence of limestone in a natural landscape, prohibits the pathogen and thus normal dieback processes should be applied including checking limestone bases for the pathogen and ensuring that all standard dieback management practices are adhered to.

Potential dieback was not indicated in the 2019 biological surveys for the TRBA (One Tree Botanical, 2020, Terrestrial Ecosystems, 2020a) however, a formal dieback assessment has not been undertaken as the risk of *Phytophthora* sp. to be present within this area is low. Potential exists for *Phytophthora* sp. and other potential pathogens (such as *Armillaria luteobubalina*) to be introduced as part of the construction process, but standard dieback and vehicle hygiene measures are considered appropriate to mitigate this risk. No significant impact is anticipated related to dieback from the TRBA project, either directly or indirectly.

5. Revegetation Commitments

Vision: The revegetation and rehabilitation will ensure that disturbed areas cleared during development of the TRBA are revegetated and rehabilitated to ensure the conservation values of the Two Rocks foreshore are protected and managed.

Objectives: The main goals of the revegetation plan include:

- Revegetate disturbed areas with local provenance species
- Protect the environmental values surrounding the alignment of the Two Rocks foreshore area
- Manage high priority weed infestations within the revegetation area.

6. Reference Site Floristic Data

Reference site floristic data from quadrats sampled within the TRBA alignment (One Tree Botanical, 2020), the Offset site vegetation assessment (Appendix C) and opportunistic observations have been used to establish the appropriate targets and completion criteria for each vegetation community type for both sites.

The northern and southern batters on either side of the TRBA construction extent will be revegetated with six different types of vegetation units, as represented in Table 4, identified in the Biological Report (One Tree Botanical, 2020) and shown in Figures 3 and 13. Quadrats were selected as reference sites within each vegetation community, to represent the floristic composition within these different vegetation types. These reference sites will be used as a

baseline to assess the future success of the revegetation. The relevant reference sites for each vegetation site and areas of both the northern and southern batters are identified in Table 4 and illustrated in Figure 8.

Table 4: Vegetation Type Reference Sites

Vegetation Type	Relevant Reference Sites within TRBA	Revegetation Area North Batter in TRBA (ha)	Revegetation Area South Batter in TRBA (ha)
A2	TR01, TR05	0.000	0.0119
A3	TR02, TR03	0.0486	0.0747
B1	TR07, TR08, TR09, TR14	0.1261	0.1773
C1	TR12, TR10, TR13	0.0480	0.0574
D1	TR06, TR11	0.2596	0.0732

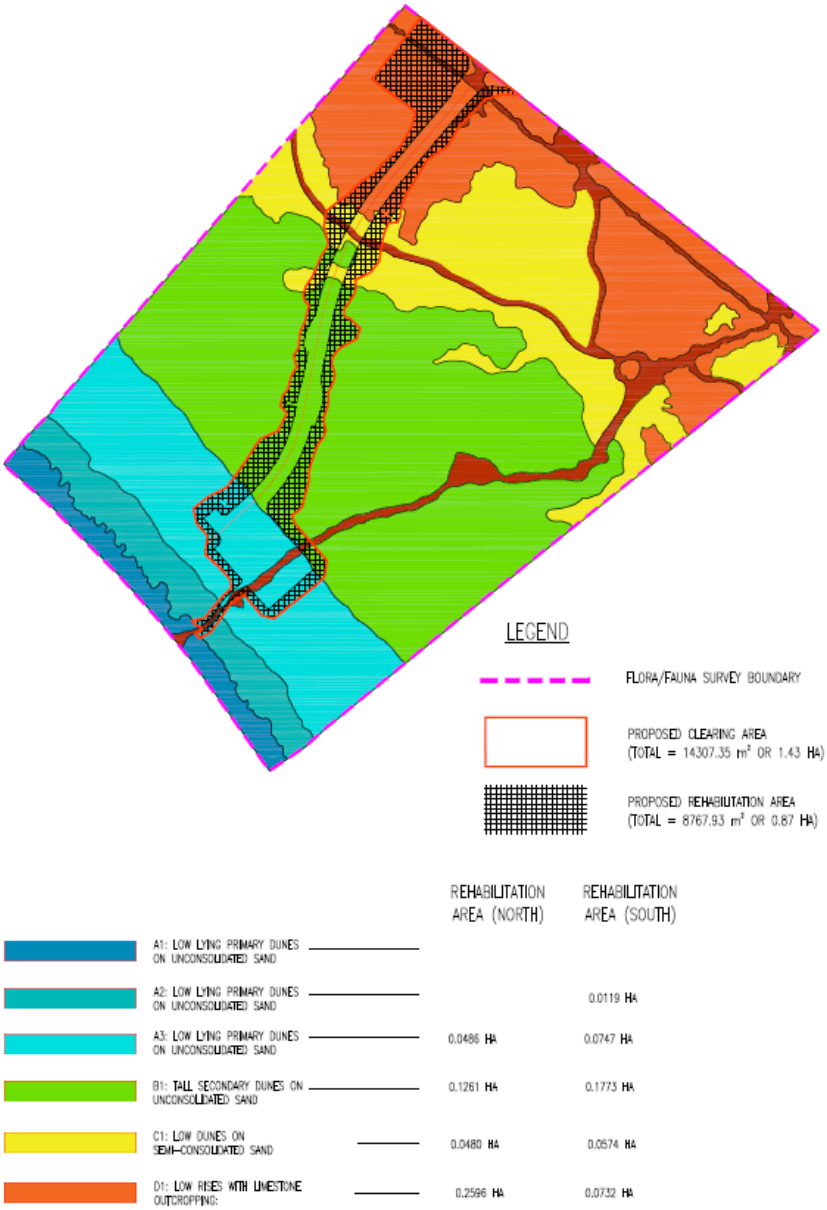


Figure 8: Rehabilitation area categorised by Vegetation types for the Northern and Southern batters, the Two Rocks Beach Access

Individual species lists have been developed for each of the rehabilitation areas in the TRBA in order to align with each of the different vegetation types. Whilst every effort has been made to replicate the species composition, the ratios vary slightly due to the practical challenges involved in recreating these vegetation types (i.e. ability to collect and/or propagate a species). The resulting revegetation species lists have therefore been slightly modified to ensure improved on-ground outcomes. These modifications are summarised for both sites in Table 5.

Table 5: Explanation of modifications to species lists to ensure improved rehabilitation outcomes

Reason for modification	Effected Vegetation Type TRBA
A dominant species in this vegetation type is a weed (*Thinopyrum distichium*). Replicating this species in the rehabilitation would not be a good ecological outcome, so the species has been omitted from the rehabilitation list. Removal of the species may result in erosion to the front dune and therefore will be left in place and other *Spinifex* sp. planted in bare areas adjacent. All other weed species (60 in total) will be managed rather than removed from both sites as the removal of these species may exacerbate erosion of the dunes.	A2
Orchid species (five in total) have been removed as they are too difficult to collect and propagate: *Caladenia latifolia* *Cyrtostylis huegelii* *Eriochilus d. subsp. dilatatus* *Leptoceras menziesii* *Microtis m. subsp. media*	A3 B1 C1 D1
Annual species are difficult to collect and propagate, however, the City will undertake an opportunistic collection of the below species and direct seed where possible: *Daucus glochidiatus* *Hydrocotyle hispidula* *Hydrocotyle pilifera var. glabrata* *Trachymene pilosa* *Hyalosperma cotula* *Leptorhynchos scaber* *Rhodanthe citrina* *Senecio vulgaris* *Isotoma hypocrateriformis* *Silene gallica var. gallica* *Crassula c. var. colorata* *Schoenus clandestinus* *Schenkia australis* *Triglochin isingiana* *Triglochin nana* *Poranthera microphylla* *Parietaria debilis* Moss	A3 B1 C1 D1
Opportunistic species have not been included as they are only minor species and not representative of the existing baseline data (i.e. quadrats): *Millotia myosotidifolia* *Podotheca gnaphalioides* *Allocasuarina l. subsp. lehmanniana* *Salsola australis* *Acrotriche cordata* *Tricoryne elatior*	ALL
The following species have not been included as it is too invasive and may outcompete other important establishing species: *Cassytha aurea var. aurea* *Cassytha flava* *Cassytha glabella forma. casuarinae* *Cassytha r. forma. racemosa*	C1
The following species have been included in the species list however it is not guaranteed that they will be able to be planted due to either their known difficulty in propagation and/or seed collection: *Beyeria c. subsp. cinerea* (P3) *Cryptandra mutila* *Drosera macrantha*	A2 A3 B1 C1 D1

Leptomeria preissiana *Leucopogon insularis* *Leucopogon maritimus* (P1) *Leucopogon parviflorus* *Lysinema pentapetalum* *Pelargonium littorale*	
Other minor species have not been included in the species list as it is more important to focus propagation on the more common species. These minor species are likely to regenerate however from the seed bank in the reserved topsoil: *Wurmbea monantha* *Rytidosperma occidentale* *Austrostipa flavescens* *Poa porphyroclados*	B1 C1 D1

7. Targets and Completion Criteria

This revegetation plan will be implemented over a three year period. The targets and completion criteria for the rehabilitation of the TRBA northern and southern batters are outlined in Table 6 and have been developed to meet the objectives of the RRP. Further detail and the timing of these actions are included in the schedule (Table 7).

Table 6: Completion criteria, targets and monitoring for areas of revegetation

Criterion	Baseline floristic data	Completion targets	Completion criteria	Monitoring
1	Species richness is the average number of species between the reference sites of each vegetation community.	Minimum of 50% of native vegetation species returned based on propagation capacity of species. Therefore revegetation areas shall have a minimum of 50% native species per quadrat, as obtained by the average recorded at the reference sites.	Species richness and number of plants / m^2 in revegetation areas shall have a minimum of 50% native species per quadrat, as obtained by the average recorded at the reference sites.	The species and number of plants / m^2 in the revegetation areas will be counted in years 2, 3 and 5.
2	% cover of weeds in quadrats of each vegetation community is 2% - 30%	Weeds are mostly absent from the quadrats. Considering external pressures (adjacent areas used for public recreation) a target of ≤10% has been established for the revegetation areas.	The revegetation areas must have % cover of ≤10% weeds.	Monitor revegetation areas in years 2, 3 and 5.
3	Survival rate of species to be achieved	If after year 2 and year 3 of planting, a survival rate of 2 plants/m^2 is not achieved, all planted tube stock that have not survived must be replanted within 12 months and monitored for a further 1 year.	The revegetation areas need to ensure a survival rate of no less than 2 plants/m^2 is achieved after three years, and replant any plants within 12 months of dying.	The number of surviving plants in revegetation areas will be counted in years 2, 3 and 5.
4	Rubbish is not present in dune environments.	Rubbish is absent from the revegetation areas.	The revegetation areas contain minimal rubbish.	Monthly asset inspections
5	Unauthorised access is minimised	Fencing is installed and maintained to prevent unauthorised access to the revegetation areas.	Fencing is maintained and there are no visible signs of vandalism and/or unauthorised access to revegetation areas.	Monthly asset inspections
6	Feral animals are mitigated	Potential impacts from introduced animals are	Mitigation measures are implemented if there	Monitor revegetation areas

		monitored and mitigated, where required.	are visible signs of introduced animals species e.g. rabbits, foxes etc.	-as part of annual reports and as part of monthly asset inspections
7	Priority species are retained	All priority species located immediately outside the construction area are to be retained.	No priority species located immediately outside the construction area are impacted.	The priority species are demarcated before, during and after the UXO search and construction works

7.1 Vegetation Establishment

Vegetation establishment in the revegetation areas will occur by spreading topsoil, mulch and the planting of tube stock. Technical specifications detailing vegetation establishment techniques are included within Appendix C - Section 3.

7.2 Seed Collection, Plant Salvage and Propagation

Local provenance species will be sourced from the project site and other reserves suitable for supplying the seed quantities required to meet completion criteria. To ensure sustainable collection practices, seed will be sourced from the following reserves:

- Tamala Park, Mindarie & Burns Beach, CoW and City of Joondalup (CoJ);
- Longbeach Reserve, Quinns Rocks, CoW;
- Claytons Beach reserve, Mindarie, CoW;
- Burns Beach Reserve, Burns Beach, CoJ;
- Mindarie Foreshore, Mindarie, CoW;
- Quinns Rocks Foreshore, Quinns Rocks, CoW; and
- Yanchep Foreshore, Yanchep, CoW.

The timing of seed collection is detailed in the rehabilitation schedule for each site (Table 7 – TRBA site). The City of Wanneroo will engage a contractor (certified by the Revegetation Industry Association of Western Australia (RIAWA)) to undertake seed collection, plant salvage and propagation works. Seed collection and plant propagation will be carried out in accordance with the specifications outlined in Sections 1 and 2 of Appendix C.

Species' lists for seed collection and propagation, in the first four years during and after construction, are provided in Table 8. The species lists have been developed using data collected from the biological survey and prior experience in developing and implementing revegetation projects.

A contractor (certified by the Revegetation Industry Association of Western Australia (RIAWA)) will be engaged to salvage plants that are not able to be propagated commercially and would be cleared as part of the project. The salvage of plants will occur once the UXO search has been undertaken. The plants that can be salvaged include *Beyeria c. subsp. cinerea (P3)* and orchid species. As orchid species are not emergent species, salvage of these plants may not be successful. The City will endeavour to salvage and plant these species, however, there is no guarantee of success.

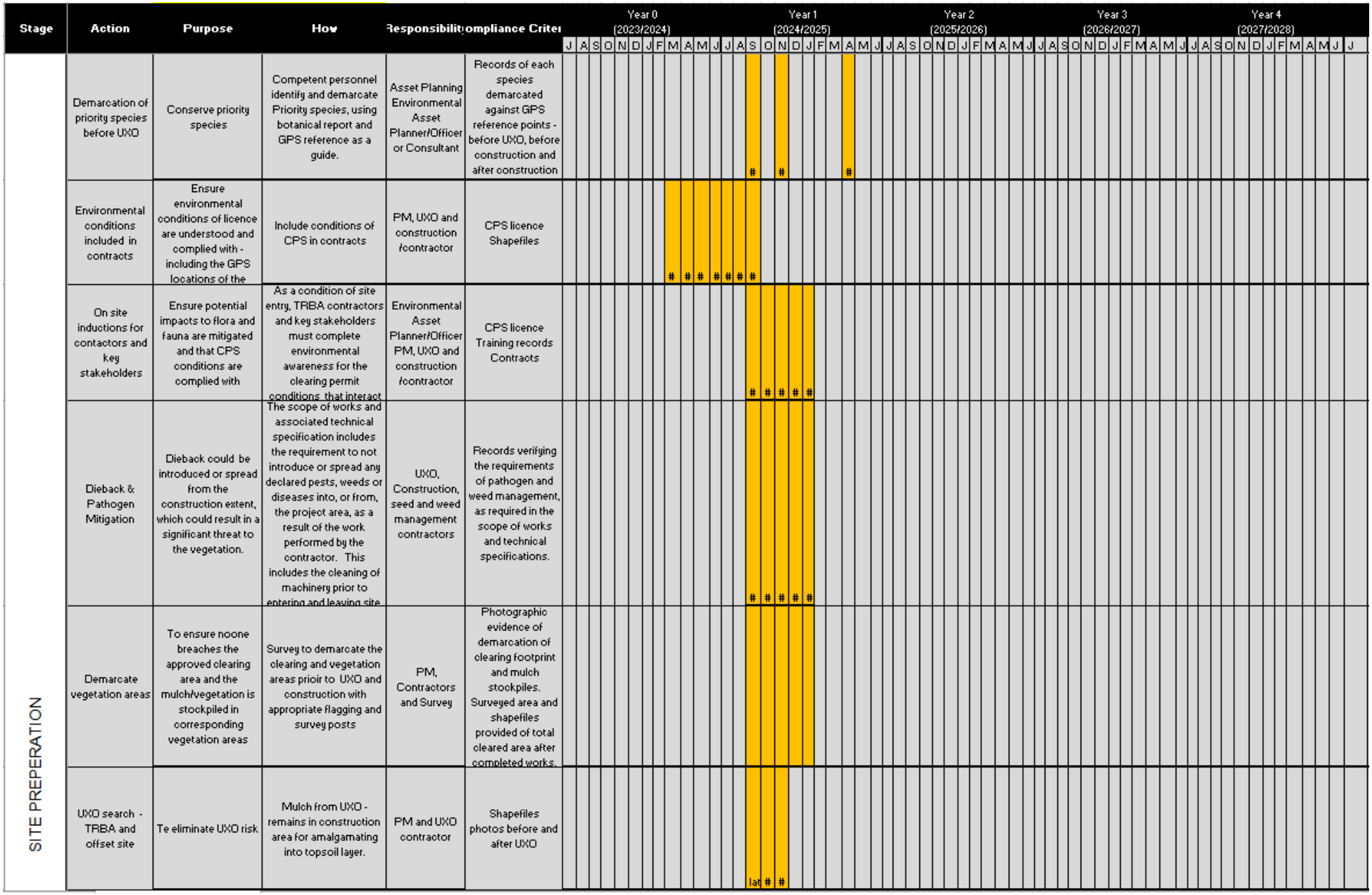
It is intended that the four individual species of Priority 3 *Beyeria cinerea* subsp. *cinerea* will be salvaged from the approved clearing areas prior to clearing vegetation and taken to the

nursery for storage and replanting. The salvaged plants will be planted in the revegetation areas in Year 2 & 3.

Direct seeding will occur in the first year of revegetation and will include grass species listed in Table 9. Opportunistic seed collection for direct seeding of other annual species will occur in Year 0 to be spread within revegetation areas prior to planting in Year 1. The City will endeavour to collect annual species seeds where possible, however, success is not guaranteed. Direct seeding will occur at the optimal time of the year (April-May).

Table 7: Rehabilitation Schedule – TRBA Site

Stage	Action	Purpose	How	Responsibility	Compliance Criteria
SITE PREPERATION	Demarcation of priority species before UXO	Conserve priority species	Competent personnel identify and demarcate Priority species, using botanical report and GPS reference as a guide.	Asset Planning Environmental Asset Planner/Officer or Consultant	Records of each species demarcated against GPS reference points - before UXO, before construction and after construction
	Environmental conditions included in contracts	Ensure environmental conditions of licence are understood and complied with - including the GPS locations of the	Include conditions of CPS in contracts	PM, UXO and construction /contractor	CPS licence Shapefiles
	On site inductions for contactors and key stakeholders	Ensure potential impacts to flora and fauna are mitigated and that CPS conditions are complied with	As a condition of site entry, TRBA contractors and key stakeholders must complete environmental awareness for the clearing permit conditions that interact	Environmental Asset Planner/Officer PM, UXO and construction /contractor	CPS licence Training records Contracts
	Dieback & Pathogen Mitigation	Dieback could be introduced or spread from the construction extent, which could result in a significant threat to the vegetation.	The scope of works and associated technical specification includes the requirement to not introduce or spread any declared pests, weeds or diseases into, or from, the project area, as a result of the work performed by the contractor. This includes the cleaning of machinery prior to entering and leaving site	UXO, Construction, seed and weed management contractors	Records verifying the requirements of pathogen and weed management, as required in the scope of works and technical specifications.
	Demarcate vegetation areas	To ensure noone breaches the approved clearing area and the mulch/vegetation is stockpiled in corresponding vegetation areas	Survey to demarcate the clearing and vegetation areas prioir to UXO and construction with appropriate flagging and survey posts	PM, Contractors and Survey	Photographic evidence of demarcation of clearing footprint and mulch stockpiles. Surveyed area and shapefiles provided of total cleared area after completed works.
	UXO search - TRBA and offset site	Te eliminate UXO risk	Mulch from UXO - remains in construction area for amalgamating into topsoil layer.	PM and UXO contractor	Shapefiles photos before and after UXO



Stage	Action	Purpose	How	Responsibility	Compliance Criteria	Year 0 (2023/2024) J A S O N D J F M A M J	Year 1 (2024/2025) J A S O N D J F M A M J	Year 2 (2025/2026) J A S O N D J F M A M J	Year 3 (2026/2027) J A S O N D J F M A M J	Year 4 (2027/2028) J A S O N D J F M A M J
	Salvaging of priority species	Some species are not able to propagated commercially and are priority species which can be salvaged.	UXO to liaise with the Environmental Asset Planner/Officer before they approach Priority species area so that the four indivisuals can be salvaged and used in rehabilitation.	PM Revegetation/ contractor	Receipts from contractor, photos of salvaged plants		lat # #			
	Weed management	Carry out weed management to target prominent weeds before construction commences.	Targeted weed spraying	PM Revegetation/ contractor	Weed contractor invoices					
	Initial Rubbish Removal	Waste should be lawfully removed and disturbance and handling of topsoil minimised during the construction and rehabilitation processes. Increased handling of topsoil could lead to an incremental loss of topsoil and reduced potential seed source for rehabilitation	An inspection of the construction extent will be completed prior to the commencement of construction to ensure that all waste is identified, hand-picked and removed.	PM Construction contractor	Waste removal receipts and applicable controlled waste documentation		#			
	Seed Collection	Seed will be collected from the relevant vegetation communities to ensure completion criteria is achieved (species richness)	Local provenance species will be sourced from Two Rocks and other reserves suitable for supplying the seed quantities required to meet completion criteria	CoW PM and seed contractor	Seed collection and storage receipts					
	Demarcation of clearing area and vegetation types	Ensure compliance with the permitted clearing area and ensure the relevant materials are placed back onto the batters in the areas, and vegetation types, from which they were sourced.	The construction extent and each of the vegetation types that transect within the construction extent will be demarcated before clearing commences, as outlined in the tender document. E.g. TRBA colour coding, after UXO search	PM construction /contractor	Photographic evidence of demarcation of clearing footprint and topsoil stockpiles. Surveyed area and shapefiles provided of total cleared area after completed works.		# # # #			

Stage	Action	Purpose	How	Responsibility	Compliance Criteria	Year 0 (2023/2024)												Year 1 (2024/2025)												Year 2 (2025/2026)												Year 3 (2026/2027)												Year 4 (2027/2028)											
						J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
CONSTRUCTION	Installation of fencing, including feral proof fencing behind the revegetation areas, and gates	Stop unauthorised access and ensure that clearing area is not exceeded. Fencing will protect the revegetation areas and adjacent bushland	Installation of deterrent (e.g.large boulders after UXO search and fencing) and before construction)along construction extent, in accordance with Appendix 2, Section 3.	PM construction /contractor	Photos of deterrents and fencing.													#	#	#	#	#	#	#																																								
	Collect Mulch	Mulch will create a cover for the revegetation batters, is a useful method for collecting seed stock from the vegetation, and a sustainable method for disposing of the vegetation.	Vegetation will be trimmed and grubbed from each of the corresponding vegetation types and chipped into mulch, through the use of a vegetation chipping device. The mulch will be stockpiled for use in the revegetation of the batters.	PM construction /contractor	Mulch placed into respective vegetation types - marked out by flagging or signs. Photos of vegetation, chipper being used and mulch stockpiles.													#	#	#	#																																												
	Collect Topsoil	Topsoil is a valuable seed source and required for the revegetation of the batters.	After vegetation removal, the top 75 mm of the topsoil will be removed and stockpiled for later use in the revegetation of the batters. The relvant mulch will be placed on top of the respective top soil stockpiles.	PM construction /contractor	Topsoil placed into respective vegetation types - marked out by flagging or signs. Photos of topsoil stockpiles.													#	#	#	#																																											
	Construction	To ensure that the construction of the TRBA is built in compliance with the clearing permit.	Prior to vegetation establishment, site preparation and protection activities will be undertaken in accordance with specifications outlined in Appendix C, Section 3. Specifications of the revegetation plan are built into the scope of work for the construction contractor.	PM construction /contractor	TRBA Construction Scope of works													#	#	#	#																																											
			Ensure compliance with the conditions of the clearing permit and scope of work.	PM construction /contractor	On site inspections and evidence required as part of construction tender and scope of works.													#	#	#	#																																											

Stage	Action	Purpose	How	Responsibility	Compliance Criteria	Year 0 (2023/2024) J A S O N D J F M A M J	Year 1 (2024/2025) J A S O N D J F M A M J	Year 2 (2025/2026) J A S O N D J F M A M J	Year 3 (2026/2027) J A S O N D J F M A M J	Year 4 (2027/2028) J A S O N D J F M A M J
	Plant propagation	Ensure species of the relevant vegetation communities are available for future planning and that the completion criteria are achieved.	Propagation of species from collected seed to enable the required vegetation to be planted to meet the completion criteria.	Revegetation contractor	Invoices, photos and records of propagation		# # # # # # # #	# # # # # # # #	# # # # # # # #	# # # # # # # #
VEGETATION ESTABLISHMENT	Spread Topsoil	Topsoil is a valuable seed source and required for the revegetation of the batters.	The topsoil will be spread onto the revegetation areas, in the corresponding vegetation types, along the northern and southern batters to a depth of 75 mm.	PM construction /contractor	Topsoil placed onto respective batters in the relevant vegetation types - marked out by flagging or signs. Photos of topsoil on batters.		# #			
	Spread Mulch	Mulch will create a cover for the revegetation batters and is a useful method for collecting seed stock from the vegetation, preventing erosion on the batters and a sustainable method for disposing of the vegetation.	Mulch will be returned to the batters once the topsoil has first been spread and prior to the planting of tube stock.	PM construction /contractor	Mulch placed onto respective batters in the relevant vegetation types - marked out by flagging or signs. Photos of mulch on batters.		# #			
	Install coir matt installation	Stabilise and prepare surface batters for planting	Matting will be installed using City contractor and specifications	PM/Construction contractor	Suitable Matting placed on respective batters					
	Direct Seeding	Direct seeding of annual species, including grass species, will assist in achieving the completion criteria.	Direct seeding will occur to meet the specified completion criteria and in accordance with Appendix 2.	Revegetation contractor	Photos of direct seeding being undertaken					
	Planting of tube stock and salvaged plants	Planting of tube stock and salvaged plants will assist in stabilising the batters and assist in achieving the completion criteria.	Tube stock and salvaged plants will be established to meet the specified completion criteria, and in accordance with Appendix 2.	Revegetation contractor	Photos of planted revegetation sites		#	#	#	#

Stage	Action	Purpose	How	Responsibility	Compliance Criteria	Year 0 (2023/2024) J A S O N D J F M A M J	Year 1 (2024/2025) J A S O N D J F M A M J	Year 2 (2025/2026) J A S O N D J F M A M J	Year 3 (2026/2027) J A S O N D J F M A M J	Year 4 (2027/2028) J A S O N D J F M A M J
	Dieback Mitigation	Disease (such as dieback)could potentially be introduced or spread from this project area. The introduction of disease could result in a significant threat to the vegetation.	The TRBA scope of works and associated technical specification includes the requirement to not introduce or spread any declared pests, weeds or diseases in to or from the project area, as a result of the work performed by the contractor. This includes the cleaning of machinery prior to entering and leaving site.	Construction, seed and weed management Contractors	Records shall be kept by the contractor verifying the requirements of pathogen and weed management, as required in the scope of works and technical specifications.	#	#	#	#	#
	Watering	Watering the revegetation will be required to assist in the establishment of the plants.	As specified in Appendix 2	Revegetation contractor	Contractor invoices					
MONITORING	Weed management	To manage the potential recruitment of weeds over the rehabilitation maintenance period.	Monitor the emergence of weeds as part of the annual revegetation monitoring program.	Botanical Consultant	Weed monitoring results included in the annual monitoring report.	## ## ##	##	## ## ##	##	## ## ## ##
	Maintenance of rubbish, fencing, signage and gates	Ensure measures are effective in managing potential impacts to the revegetation site and completion criteria is achieved.	Monthly rubbish and maintenance inspection and pickup	CoW	Contractor invoices Photos					
	Dieback Mitigation	Dieback could potentially be introduced to. or spread from, this project area. The introduction of disease could result in a significant threat to the vegetation.	The scope of works and technical specification includes the requirement to not introduce or spread any declared pests, weeds or diseases in to or from the project area, as a result of the work performed by the contractor. This includes the cleaning of machinery prior to	Construction, seed and weed management Contractors	Records shall be kept by the contractor verifying the requirements of pathogen and weed management					

Stage	Action	Purpose	How	Responsibility	Compliance Criteria	Year 0 (2023/2024) J A S O N D J F M A M J	Year 1 (2024/2025) J A S O N D J F M A M J	Year 2 (2025/2026) J A S O N D J F M A M J	Year 3 (2026/2027) J A S O N D J F M A M J	Year 4 (2027/2028) J A S O N D J F M A M J
MAINTENANCE	Monitoring of unauthorised vehicles	Unauthorised vehicles cause damage and destruction of vegetation and exacerbates erosion of landscapes.	The activity of unauthorised vehicles will continue to be monitored throughout this project, with relevant actions implemented, as required.	Monitor project area - Construction Contractor and CoJ. Peet and Satterly manage unauthorised access from their respective developments	Evidence of implemented actions by relevant party e.g.. Photos	As required				
	Monitoring of revegetation site	To ensure that the revegetation site is complying with the completion criteria	Monitoring of the vegetation site each September to monitor compliance with the completion criteria and develop contingency for criteria not being achieved - needs to be done before replanting but also as per EPA guidelines	Botanical Consultant	Revegetation monitoring results included in the annual monitoring report.					
	Weed management	To manage the potential recruitment of weeds over the rehabilitation maintenance period.	Implement a weed management program (in accordance with specifications outlined in Appendix C, Section 3) throughout the year to effectively mange the emergence and spread of weeds.	Weed Management contractor	Weed contractor invoices					
	Watering	Where criteria listed in Table 7 are identified as 'at risk' of meeting targets, contingency measures such as remedial planting and watering will be implemented.	Maintenance activities will be undertaken where required over the three year period as outlined in Appendix C, Section 3.	CoW and revegetation contractor	Contractor invoices					
	Plant infill and propagation	Assesment against the rehabilitation success monitoring reports and the Planting of tube stock and salvaged plants will assist in stabilising the batters and assist in achieving the completion criteria.	Tube stock and salvaged plants will be established to meet the specified completion criteria, and in accordance with Appendix 2 and assessment against the monitoring reports.	PM/Revegetation contractor	Photos of planted revegetation sites					

Stage	Action	Purpose	How	Responsibility	Compliance Criteria	Year 0 (2023/2024) J A S O N D J F M A M J	Year 1 (2024/2025) J A S O N D J F M A M J	Year 2 (2025/2026) J A S O N D J F M A M J	Year 3 (2026/2027) J A S O N D J F M A M J	Year 4 (2027/2028) J A S O N D J F M A M J
	Remedial planting	Where criteria listed in Table 7 are identified as 'at risk' of meeting targets, contingency measures such as remedial planting and watering will be	Maintenance activities will be undertaken where required over the three year period as outlined in Appendix C, Section 3.	CoW and revegetation contractor	Contractor invoices Photos					
	Inspection of fencing and revegetation areas	Ensure measures are effective in managing potential impacts to the revegetation site and completion criteria is achieved.	Where criteria listed in Table 7 are identified as 'at risk' of meeting targets, contingency measures such as remedial planting and watering will be implemented. Maintenance activities will be undertaken where required over the three year period as outlined in Appendix C, Section 3.	CoW	Contractor invoices Photos					
REPORTING	Compliance report to DWER	Ensure the clearing permit conditions are complied with and that the revegetation is achieving the completion criteria.	Requirements of clearing permit are monitored and reported in an approved DoWER format	CoW	DoWER receive reports as required under Clearing Permit	#	#	#		

Legend

*	Contingency - dependant on results of monitoring
**	Dependant on rainfall
#	Dependant on approvals

Asset Planning Environmental Asset Planner/Officer - City of Wanneroo
PM = Project Manager (City of Wanneroo)

Table 8: Species Propagation and Planting List

SPECIES	PLANTS REQUIRING PROPAGATION					
	Two Rocks Beach Access Site					
	A2	A3	B1	C1	D1	Total
Acacia cyclops		225 90 90 45	700 280 280 140	40 40 40 40		965 410 410 225
Acacia l. var. lasiocarpa				200 200 200 120		200 200 200 120
Acacia rostellifera				20 20 20 20		20 20 20 20
Acacia xanthina				40 100 50 50	800 500 400 200	840 600 450 250
Acanthocarpus preissii			525 525 600 200	300 300 300 150	945 800 600 500	1770 1625 1500 850
Allocasuarina l. subsp. lehmanniana					135 150 115 50	135 150 115 50
Carex thecata					45 45 45 45	45 45 45 45
Carpobrotus virescens		540 225 225 90	245 105 105 35			785 330 330 125
Clematis linearifolia				50 20 20 20		50 20 20 20
Conostylis candicans subsp. calcicola			175 175 175 70	50 20 20 20		225 195 195 90
Conostylis c. subsp. candicans				50 20 20 20		50 20 20 20
Cryptandra mutila				20 20 20 20		20 20 20 20
Dianella revoluta var. divaricata				50 20 20 20	45 135 135 45	95 155 155 65
Dodonaea aptera				60 80 80 40	135 135 135 135	195 215 215
Eremophila glabra subsp. albicans				20 20 20 20		20 20 20 20

SPECIES	PLANTS REQUIRING PROPAGATION					
	Two Rocks Beach Access Site					
	A2	A3	B1	C1	D1	Total
Exocarpos sparteus			35 70 70 35			35 70 70 35
Ficinia nodosa			175 280 280 140			175 280 280 140
Gastrolobium nervosum				100 80 80 80		100 80 80 80
Gompholobium tomentosum				25 20 20 20		25 20 20 20
Guichenotia ledifolia					90 80 90 90	90 80 90 90
Hardenbergia comptoniana			70 105 105 35	20 20 20 20		90 125 155 55
Hemiandra glabra			105 105 105 105	20 20 20 20		125 125 125 125
Kennedia prostrata				20 20 20 20	225 115 115 150	245 135 135 170
Lepidosperma gladiatum					600 500 500 360	600 500 500 360
Leptomeria preissiana		45 45 45 25	35 35 35 20	40 40 40 20	25 25 25 25	145 145 145 90
Leucopogon insularis				20 20 20 20	225 90 90 90	245 110 110 110
Leucopogon parviflorus				20 20 20 20	245 90 90 90	245 110 110 110
Lomandra maritima				600 500 500 200	1000 1200 1200 500	1600 1700 1700 700
Melaleuca cardiophylla					990 500 500 360	990 500 500 360
Melaleuca h. subsp. huegelii					450 45 45 45	450 45 45 45
Melaleuca systena				120 240 240	315 540 540	435 780 780

SPECIES	PLANTS REQUIRING PROPAGATION					
	Two Rocks Beach Access Site					
	A2	A3	B1	C1	D1	Total
				160	360	
Myoporum insulare		135 450 450 225	265 525 525 265		225 115 115 115	625 1090 1090 605
Olax benthamiana				40 40 40 40		40 40 40 40
Olearia axillaris	300 30 30 20	2200 225 225 135	525 265 265 140	40 20 20 20	90 45 45 25	3155 585 585 340
Opercularia vaginata				80 40 40 80		80 40 40 80
Phyllanthus calycinus				40 40 40 40		40 40 40 40
Pimelea ferruginea				40 40 40 40		40 40 40 40
Pithocarpa cordata		270 45 45 25	105 70 70 35		25 25 25 25	400 140 140 85
Rhagodia b. subsp. baccata	80 10 10 10	900 45 45 45	350 175 175 90		135 90 90 45	1465 320 320 190
Santalum acuminatum			35 35 35 20		45 45 45 25	80 80 80 45
Scaevola crassifolia	100 20 20 20		980 1560 560 350			1080 580 580 370
Scaevola t. subsp. Thesioides				80 40 50 80		80 40 50 80
Senecio pinnatifolius var. latilobus		45 45 45 25	140 70 70 35	40 20 20 20		225 135 135 80
Spinifex longifolius	50 50 75	2160 2160 300	350 350 70			2560 2560 990
Spyridium globulosum			700 525 600 300	120 60 100 50	450 340 400 200	1270 925 1100 550
Templetonia retusa				40 40 40 80	135 135 135 135	175 175 175 215
Thomasia triphylla					25 45 45	25 45 45

SPECIES	PLANTS REQUIRING PROPAGATION					
	Two Rocks Beach Access Site					
	A2	A3	B1	C1	D1	Total
					45	45
Threlkeldia diffusa			175 70 70 70			175 70 70 70
Tricoryne elatior					25 45 45 45	25 45 45 45
Trymalium l. var. ledifolium					90 90 90 90	90 90 90 90
Westringia dampieri				20 20 20 20	25 90 90 90	45 110 110 110

Note – Plant propagation and installation in 2024/2025, seed collection in 2023/2024
Plant propagation and installation in 2025/2026, seed collection in 2024/2025
Plant propagation and installation in 2028/2027, seed collection in 2025/2026
Plant propagation and installation in 2027/2028, seed collection in 2026/2027

Table 9: Species Direct Seeding List Collected from Opportunistic Seed Collection

SPECIES	Direct Seeding				
	Two Rocks Beach Access Site				
	A2	A3	B1	C1	D1
Austrostipa flavescens	✓	✓	✓	✓	✓
Poa porphyroclados					
Rytidosperma occidentale					

7.3 Topsoil and Mulch

The construction extent of the TRBA, fencing alignment for the offset site and each of the vegetation types that transect within these (in accordance with Figure 3) will be demarcated before the UXO search and clearing commences. This will enable the contractor to stockpile any mulch and topsoil material from each vegetation types in the marked corresponding area.

This process assists with the relevant materials being placed back onto the batters in the areas, and vegetation types, from which they were sourced. Due to the lack of tall canopy and the overall height of the vegetation types within both sites, it is not anticipated that considerable mulch will be recovered.

Vegetation will be trimmed and grubbed from each of the corresponding vegetation types and chipped into mulch, through the use of a vegetation chipping device. As described above, the mulch will be stockpiled and returned to the batters once the topsoil has first been spread (see Schedule – Table 7). The mulch will be spread over the revegetation area prior to planting.

The timing of topsoil and mulch spreading is provided in the schedule (Table 7). After vegetation removal has occurred within the TRBA construction area, the top 75 mm of the topsoil will then be removed and stockpiled in accordance with the above described practices. The topsoil will be spread onto the revegetation areas, in the corresponding vegetation types, along the southern and northern batters to a depth of 75 mm.

Whilst it is acknowledged that the topsoil may retain a source of weeds, it is not practical to remove the weed infested topsoil as the loss of native seed resource will be a far greater loss. It is more practical to establish a weed management program to target the prominent weed species and reduce the amount of weed seed source that may be stored in the topsoil. After the establishment of plants, a targeted weed program will take place to manage the potential recruitment of weeds over the rehabilitation maintenance period.

7.4 Site Preparation and Protection

Prior to vegetation establishment, site preparation and protection activities will be undertaken in accordance with specifications outlined in Appendix C. Weed treatment for the species listed in Table 3 will be undertaken in the revegetation area. A single rail conservation fence (Appendix C) will be installed along the TRBA to protect the revegetation areas and adjacent bushland and a feral proof fence will be installed along the outer extents of the revegetation areas to prevent grazing of plantings. The timing of site preparation activities are provided in the schedule (Table 7).

7.5 Maintenance

Maintenance activities will be undertaken following vegetation establishment and site protection activities to ensure measures are effective in managing the disturbances and threats to revegetation areas (Table 7) and conditions are on target for meeting completion criteria (Table 6). Post planting weed control will be undertaken in accordance with specifications outlined in Appendix C. Where criteria listed in Table 6 are identified as ‘at risk’ of meeting targets, contingency measures such as remedial planting and watering will be implemented. Maintenance activities will be undertaken where required over the three year period as outlined in Appendix C.

8. Schedule and Budget

A preliminary schedule (Table 7) has been developed for site preparation, vegetation establishment, monitoring, maintenance and reporting for the revegetation areas. The City of Wanneroo is responsible for implementing the construction and site preparation actions and will resource the revegetation and maintenance of the TRBA, utilising technical expertise from existing personnel and contractors. Timing of some actions may be dependent on project

approval and schedules (i.e. spreading of topsoil). The schedule will be revised in accordance with project approvals and construction schedules.

A cost estimate for the revegetation and maintenance of the construction extent is provided in Table 8. When preparing the cost estimate, some assumptions have been made which include;

- Increase of CPI of 5% pa (compounding each year);
- Topsoil and mulch to be supplied free of charge, costs to spread only; and
- That funding will be available to commence seed collection in FY 2023 with revegetation activities following in subsequent financial years.

Table 8: Budget and Costings – TRBA

Actions	Year 0 (23/24)	Year 1 (24/25)	Year 2 (25/26)	Year 3 (26/27)	Year 4 (27/28)	Year 5 (28/29)	Total
Weed management	$ -	$ 14,560.00	$ 22,920.00	$ 24,070.00	$ 19,800.00	$ 19,800.00	**$ 101,150.00**
Seed collection	$ 8,050.00	$ 27,470.00	$ 12,430.00	$ 6,940.00	$ -	$ -	**$ 54,890.00**
Salvage of plants	$ -	$ 3,000.00	$ -	$ -	$ -	$ -	**$ 3,000.00**
Plant supply	$ -	$ 29,320.00	$ 38,860.00	$ 28,440.00	$ 13,650.00	$ -	**$ 110,270.00**
Collection and propagation of difficult species	$ -	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	**$ 40,000.00**
Planting of tube stock and salvaged plants	$ -	$ 33,820.00	$ 36,820.00	$ 31,420.00	$ 33,730.00	$ -	**$ 135,790.00**
Watering tubestock (6 applications)	$ -	$ -	$ 39,170.00	$ 44,670.00	$ 30,950.00	$ 18,480.00	**$ 133,270.00**
Monitoring of revegetation site	$ -	$ -	$ 20,000.00		$ 20,000.00	$ 20,000.00	**$ 60,000.00**
Maintenance of rubbish	$ -	$ 1,650.00	$ 3,710.00	$ 3,890.00	$ 3,200.00	$ 3,200.00	**$ 15,650.00**
Maintenance of fencing, signage and gates	$ -	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00	$ 1,500.00	**$ 7,500.00**
Feral Animal Control	$ -	$ 8,000.00	$ 8,000.00	$ 8,000.00	$ 8,000.00	$ 8,000.00	**$ 40,000.00**
Traffic control - all activities	$ -	$ 7,420.00	$ 16,270.00	$ 16,760.00	$ 13,500.00	$ 12,750.00	**$ 66,700.00**
Total	**$ 8,050.00**	**$ 136,740.00**	**$ 209,680.00**	**$ 175,690.00**	**$ 154,330.00**	**$ 92,230.00**	**$ 776,720.00**

9. Monitoring and Analysis

Monitoring will be undertaken as outlined in Table 6 and 7 to ensure the criteria are on target and will inform contingency measures where required. An environmental specialist experienced in surveying and analysing flora and vegetation on the Swan Coastal Plain will be engaged to undertake monitoring. The specialist will be required to collect flora and vegetation data for analysis of species richness, number of surviving plants, weed coverage, presence of declared weeds and other potential impacts, as described in Section 4. A report shall be prepared in accordance with Appendix C of 'A Guide to Preparing Revegetation Plans for Clearing Permits' and provided to DWER as required by the clearing permit conditions (DWER, 2018).

Personnel will undertake an inspection of the revegetation site (asset inspection) every month to ensure site protection measures (i.e. fencing) are providing the relevant protection functions for the revegetation areas and identify any issues that require maintenance. Actions to rectify issues within revegetation areas will be implemented in a timely manner by raising work orders and/or engaging a contractor.

Monitoring and reporting timeframes are outlined in the Table 7 schedule.

10. References

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11. Appendices

Appendix A: Two Rocks Beach Access Flora and Vegetation Survey (One Tree Botanical, 2020).

Appendix B: Vertebrate Fauna Survey – Two Rocks Beach Access, Two Rocks (Terrestrial Ecosystems, 2020).

Appendix C: Technical Specifications (City of Wanneroo, 2022).